

**(54) SOLID-STATE IMAGE PICKUP DEVICE**

(11) 61-99472 (A) (43) 17.5.1986 (19) JP

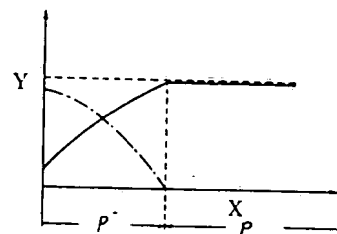
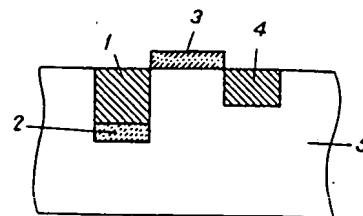
(21) Appl. No. 59-219627 (22) 19.10.1984

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(51) Int. Cl. H04N5/335, H01L27/14

**PURPOSE:** To prevent electronic generated in a bulk from entering directly into a drain to prevent the occurrence of noise by giving such sectional structure that a junction depth  $x_j$  of a photo diode part is longer than the drain part and there are  $N^+$ ,  $P^-$ , and  $P$  layers under the photo diode part.

**CONSTITUTION:** Phosphorus whose quantity is smaller than the impurity concentration of a  $P$  type substrate 5 is charged preliminarily into the photo diode part and impurity compensation to the  $P$  type substrate 5 is performed to form a  $P^-$  layer 2. The distribution chart of the impurity concentration under the photo diode part in this case is as shown in the figure, and a solid line indicates the concentration profile for formation of the  $P^-$  layer 2, and a dotted line indicates the phosphorus concentration, and a short and long dash alternating line indicates the impurity concentration of the substrate. An  $N^+$  diffusion area is provided on the layer 2 to form a photo diode 1 and a drain 4 together. Since the  $P^-$  layer 2 is formed under the photo diode part, the junction depth  $x_j$  of this part is longer than the drain part. Thus, the area where electrons which can become smear components are trapped is extended to reduce the smear quantity.



X: depth. Y: concentration

**(54) DRIVING METHOD OF SOLID-STATE IMAGE PICKUP DEVICE**

(11) 61-99473 (A) (43) 17.5.1986 (19) JP

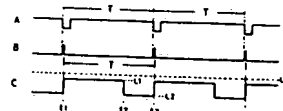
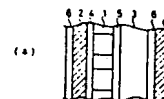
(21) Appl. No. 59-219984 (22) 19.10.1984

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(51) Int. Cl. H04N5/335

**PURPOSE:** To make a device suitable for image pickup of still pictures or the like and simplify a driving circuit and improve the element shutter function by controlling variably an overflow control gate voltage in the optical storage time of a CCD solid-state image pickup element to give the  $\gamma$  characteristic to the photoelectric conversion characteristic of a photodetector in the CCD solid-state image pickup element.

**CONSTITUTION:** A pulse B is applied to a transfer gate 5 synchronously with a vertical synchronizing clock A to transfer the stored electric charge of a photodetector 1 to a vertical shift register 3, and optical storage in the photodetector 1 is started at this time (t). A level LO indicated by a broken line in a figure C indicates the overflow control voltage of the non-storage level, and all of the photoelectric charge generated in the photodetector 1 is discharged to the external from an overflow drain 2 when this control voltage is applied to a control gate 4. That is, the same result as the case where photoelectric conversion is not performed practically is shown while the voltage of the level LO is applied. When the control voltage is controlled to a level L1 or L2, the saturation charge quantity in the photodetector 1 is changed.

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(11) 61-99474 (A) (43) 17.5.1986 (19) JP

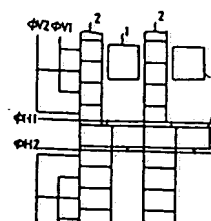
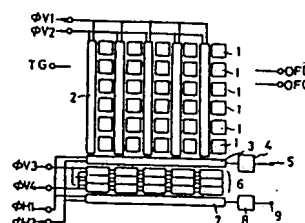
(21) Appl. No. 59-220848 (22) 20.10.1984

(71) OLYMPUS OPTICAL CO LTD (72) MASATOSHI IDA

(51) Int. Cl. H04N5/335, H01L27/14

**PURPOSE:** To obtain still images and animations of good quality easily and stably by generating and storing a photoelectric charge corresponding to an optical image in photo sensors on odd and even lines simultaneously and transferring the photoelectric charge of each line to each vertical shift register simultaneously and taking out it with the first and the second horizontal shift registers to form and output a horizontal line signal of one frame.

**CONSTITUTION:** The photoelectric charge corresponding to the optical image is generated and stored simultaneously in individual photo sensors 1 on odd and even lines corresponding to odd and even fields in a prescribed period TX in one frame and is transferred simultaneously to vertical shift registers 2. An odd line electric charge A out of the transferred electric charge is read out directly through the first horizontal shift register 3, and an even line electric charge B is stored and held temporarily in a storage register 6 after passing the first horizontal shift register 3 and is read out through the second horizontal shift register 7.



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